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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/092,711	03/07/2002	Masaki Hara	09792909-5355	2506
26263	7590	12/29/2004	EXAMINER	
SONNENSCHN NATH & ROSENTHAL LLP P.O. BOX 061080 WACKER DRIVE STATION, SEARS TOWER CHICAGO, IL 60606-1080			PRITCHETT, JOSHUA L	
			ART UNIT	PAPER NUMBER
			2872	

DATE MAILED: 12/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/092,711	Applicant(s) HARA ET AL.	
	Examiner Joshua L Pritchett	Art Unit 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 20 and 21 is/are allowed.
- 6) ☒ Claim(s) 1-19 and 22-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 May 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This action is in response to Amendment filed August 24, 2004. Claims 1-26 have been amended as requested by the applicant.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 9, 10 and 23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 9 and 23, the claim limitations that the fixed and movable sections of a hinge section are formed on a first surface of the substrate and the mirror section is formed on a second surface of the substrate. However, the claims depend from a claim that requires that the hinge section and the mirror section be integral. The examiner does not understand how the mirror section and the hinge section are to be both integral and formed on separate surfaces of a substrate.

Claim 10 depends from claim 9 and inherits the deficiencies thereof.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-8, 13-16 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Mitchell (US 6,587,612).

Regarding claims 1 and 13, Mitchell discloses a light-emitting device (20; Fig. 3), a mirror section (25) for reflecting an incident light (Figs. 5A-B; col. 3 lines 47-48), a hinge section including a fixed section and a movable section each having a flat surface (Figs. 6A-B), the mirror section and the hinge being integrally formed (Fig. 6A) such that the mirror section extends from the movable section of the hinge section and is slanted to the flat surface of the movable section of the hinge (Fig. 4A), a drive means having bi-morph structure made of two or more materials having different heat expansion coefficients for deflecting the mirror section to change a relative angle to the incident light (Figs. 2A-B, 5A-B; col. 3 lines 31-34) and an optical detector (30 and 60; Fig. 3) for detecting a return light of a light irradiated by reflecting at the mirror section.

Regarding claim 2, Mitchell discloses the mirror section is slanted approximately 55 degrees to the flat surface of the movable section of the hinge (Fig. 4A). Fig. 4A shows the

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mirror is slanted at an angle to the flat section of the hinge. The angle shown by Fig. 4A meets the claim limitation approximately 55 degrees in the broadest reasonable interpretation of the term “approximately.”

Regarding claim 3, Mitchell discloses the drive means includes a first drive film (350) provided on one surface of the moving section of the hinge section and a second drive film (340) provided on another of the surfaces of the moving section and have a larger thermal coefficient than the first drive film (Figs. 6A-B; col. 6 lines 45-48).

Regarding claims 4-6, Mitchell discloses the first drive film and the second drive film are made of poly-crystal silicon and aluminum (col. 4 lines 23-34). Aluminum and poly-crystal silicon are both conductive materials therefore they are the same “type” of material, but have different resistances to each other.

Regarding claims 7 and 15, Mitchell discloses the hinge section and the mirror section are integrally constructed on a structure film formed on a semiconductor substrate (col. 5 lines 28-35).

Regarding claims 8, 14 and 22, Mitchell discloses the semiconductor substrate is a silicon substrate (col. 5 line 30).

Regarding claim 16, Mitchell discloses the mirror section is proved to be continuous from the movable section of the hinge section and to be slanted to the flat surface on the movable section of the hinge section, thereby the relative angle to the incident light in accordance with the change of the movable section of the hinge section (Figs. 6A-B).

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 11, 12, 14, 17-19, 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitchell in view of Solgaard (US 6,389,190).

Regarding claims 11 and 12, Mitchell teaches the invention as claimed but lacks reference to a silicon nitride film. Solgaard teaches the use of a silicon nitride film as a structured film in a MEMS device (Fig. 5). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the Mitchell invention include the silicon nitride film as taught by Solgaard for the purpose of reflecting any light incident the raised portions of the structured film.

Regarding claim 17, Mitchell teaches the hinge section and the mirror section are integrally constructed on a structure film formed on a semiconductor substrate (col. 5 lines 28-35). Mitchell lacks reference to the use of grooves. Solgaard teaches forming a first groove having a first skewed surface at a side wall section on a front surface of the semiconductor substrate and a second groove having a second skewed surface substantially parallel to the first skewed surface of the first groove at a position and opposite to a flat surface section around the first groove on a back surface of the semiconductor substrate (Fig. 5), forming structured films at

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the first skewed surface of the first groove and the flat surface section around the first groove (Fig. 5) and forming the mirror section and the hinge section made of the structured film by removing the semiconductor substrate with etching process after performing a through-hole etching of the semiconductor substrate to make one of the structured films to be a free end at a bottom section of the first groove (Fig. 5; col. 3 lines 37-48). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the Mitchell invention include the groove structure taught by Solgaard to form the structured film for the purpose of attaining a precise and predictable reflection pattern.

Regarding claim 18, Mitchell teaches the invention as claimed but lacks reference to anisotropic etching. Solgaard teaches anisotropic etching performed to the first groove and the second groove after forming the first groove on the front surface of the semiconductor substrate and the second groove on the back surface of the semiconductor substrate (col. 3 lines 37-38). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the Mitchell invention include the etching taught by Solgaard to form the structured film for the purpose of attaining a precise and predictable reflection pattern.

Regarding claim 19, Mitchell teaches the invention as claimed but lacks reference to anisotropic etching. Solgaard teaches anisotropic etching is performed using a mask formed on a photo resist film with uniform thickness (Fig. 5). Solgaard lacks reference to the use of UV ray projection and spray deposition. It is extremely well known in the art to use UV ray projection to pattern a photo-resist mask and to use a spray method to form a layer of uniform thickness. Official Notice is taken. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the Mitchell invention include the etching taught by

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Solgaard to form the structured film for the purpose of attaining a precise and predictable reflection pattern.

Regarding claim 24, Mitchell teaches the invention as claimed but lacks reference to a nitride film. Solgaard teaches a nitride film is formed as the structured film at the first groove and a flat space around the first groove (Fig. 5). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the Mitchell invention include the silicon nitride film as taught by Solgaard for the purpose of reflecting any light incident the raised portions of the structured film.

Regarding claim 25, Mitchell teaches the invention as claimed but lacks reference to a nitride film. Solgaard teaches the silicon substrate is selectively removed only to leave the nitride film at the hinge section (Fig. 5). Fig. 5 shows that at the end of the substrate layer only the silicon nitride layer is present. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the Mitchell invention include the silicon nitride film as taught by Solgaard for the purpose of reflecting any light incident the raised portions of the structured film.

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mitchell in view of Ghosh (US 5,910,856).

Mitchell teaches the invention as claimed but lacks reference to the etching process. Ghosh teaches the use of an etching process in a MEMS device using potassium hydroxide, hydrazine or EDP water (col. 3 lines 53-58). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the Mitchell invention include the

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etching process of Ghosh for the purpose of precise removal of the undesired parts of the silicon substrate.

Allowable Subject Matter

Claims 20 and 21 are allowed.

The following is a statement of reasons of allowance:

Regarding claim 20, the prior art of record fails to teaches or suggest a bi-morph hinge section further comprising a metal film on the structured film constructing the mirror section and the hinge section and forming a reflection film and an electrode pad for supplying current to the reflection film by selectively etching the metal film.

Claim 21 depends from claim 20 and is allowable for the same reasons.

Response to Arguments

Applicant's arguments, see Amendment, filed September 24, 2004, with respect to claim 19 have been fully considered and are persuasive. The objection of claim 19 has been withdrawn.

Applicant's arguments filed September 24, 2004 have been fully considered but they are not persuasive.

On page 12 of Amendment applicant argues that the claims 9 and 23 are not indefinite based on their inherency to claims 7 and 15 respectively. The examiner still holds that the claims are indefinite because the claim limitations state that the mirror and the movable section are integrally formed and then claim the mirror and movable section being on two different surfaces of the substrate. The examiner does not understand how this is physically possible. The applicant's arguments are directed toward the substrate surface being structured, however the examiner still cannot determine how two pieces can be integral yet formed on different surfaces: Fig. 4 of the current application shows that the mirror (12) and the movable section (13) are both connected to a single surface of the substrate (11).

On page 13 of Amendment applicant argues that Mitchell fails to disclose a micro-mirror that extends from the movable section of the hinge and the mirror is slanted relative to the movable section. Fig. 4A of Mitchell shows that micro-mirror being slanted relative to the movable section of the hinge and the mirror being integral with the hinge. Applicant goes on to argue that the Mitchell reference only teaches the mirror to be moved in and out of the incident light or orient the mirror for the incident light. These features are not excluded by the claim limitations and therefore the reference still meets the claim limitations.

On page 14 of Amendment applicant argues that Mitchell fails to teach a micro-mirror to change the relative angle of the incident light. Based on the teachings of Fig. 4A of Mitchell, the Mitchell invention is capable of changing the relative angle of the incident light. By actuating the micro-mirror the hinge pivots the mirror upward in Fig. 4A to redirect the light in a different direction than the light contacted the mirror. If the middle micro-mirror of Fig. 4A were flat

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light the other two micro-mirrors the light would be reflected back in the direction it came.

Therefore, the Mitchell invention can change the relative angle of the incident light.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

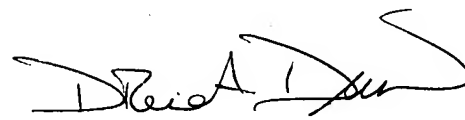
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joshua L Pritchett whose telephone number is 571-272-2318. The examiner can normally be reached on Monday - Friday 7:00 - 3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew A Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JLP *np*


DREW A. DUNN
SUPERVISORY PATENT EXAMINER